Geology Notes for the San Manuel Area

Abstracted From: Sandbak and Alexander, Geology and Rock Mechanics of the Kalamazoo Orebody, San Manuel, Arizona *in* AGS Digest Volume 20, Geology of the Porphyry Copper Deposits.

Oracle Granite
Proterozoic (1.4 billion year old) coarse-grained biotite granite with large phenocrysts of potassium feldspar.

Diabase
Two distinct occurrences are found in the San Manuel area.
Younger dikes are up to ten feet wide and are irregular, whereas older dikes are typically 150 - 200 feet wide. They range in color from red to black, and are usually hard and massive. Its texture is aphanitic to subophitic, and is composed of fine needle-like crystals of plagioclase and pyroxene.

Monzonite or **Granodiorite Porphyry**
Late Cetaceous monzonite porphyry, which is highly altered close to San Manuel. Fresh unaltered granodiorite porphyry is medium to light gray in color and composed of zoned plagioclase phenocrysts that make up 15 - 50 percent of the rock in a very fine-grained matrix of quartz and orthoclase.

Dacite Porphyry
Similar to the above rock but is usually dark gray to black in color and has fresh plagioclase phenocrysts that average 10 to 20 percent of the rock mass.

Igneous Breccia
A very hard rock material consisting mostly of quartz monzonite with lesser amounts of granodiorite porphyry.

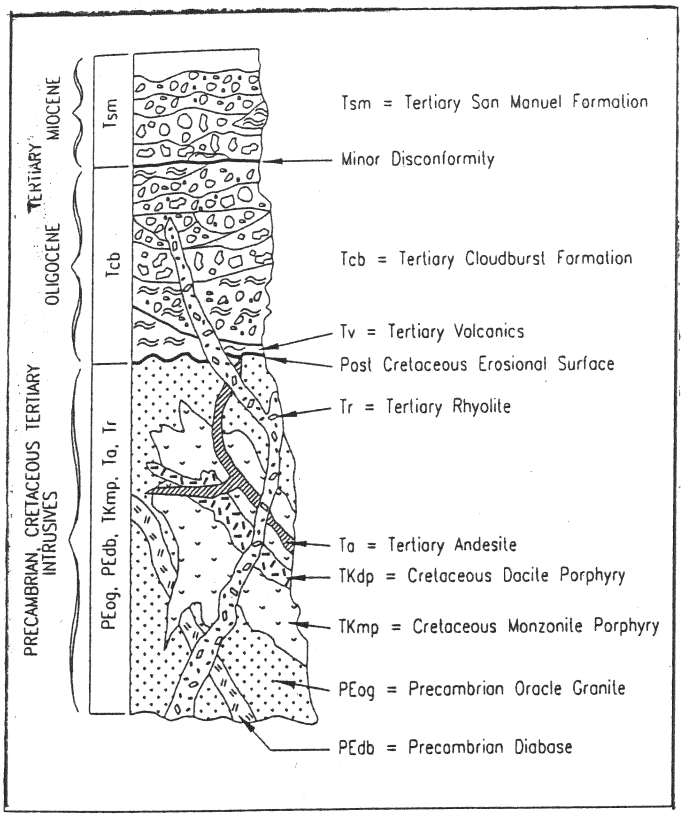
Andesite or **Andesite Porphyry**
Mid-Tertiary andesite typically forming small dikes averaging 5 to 20 feet thick along fault zones. It is very fine-grained and dark gray green to dark gray in color.

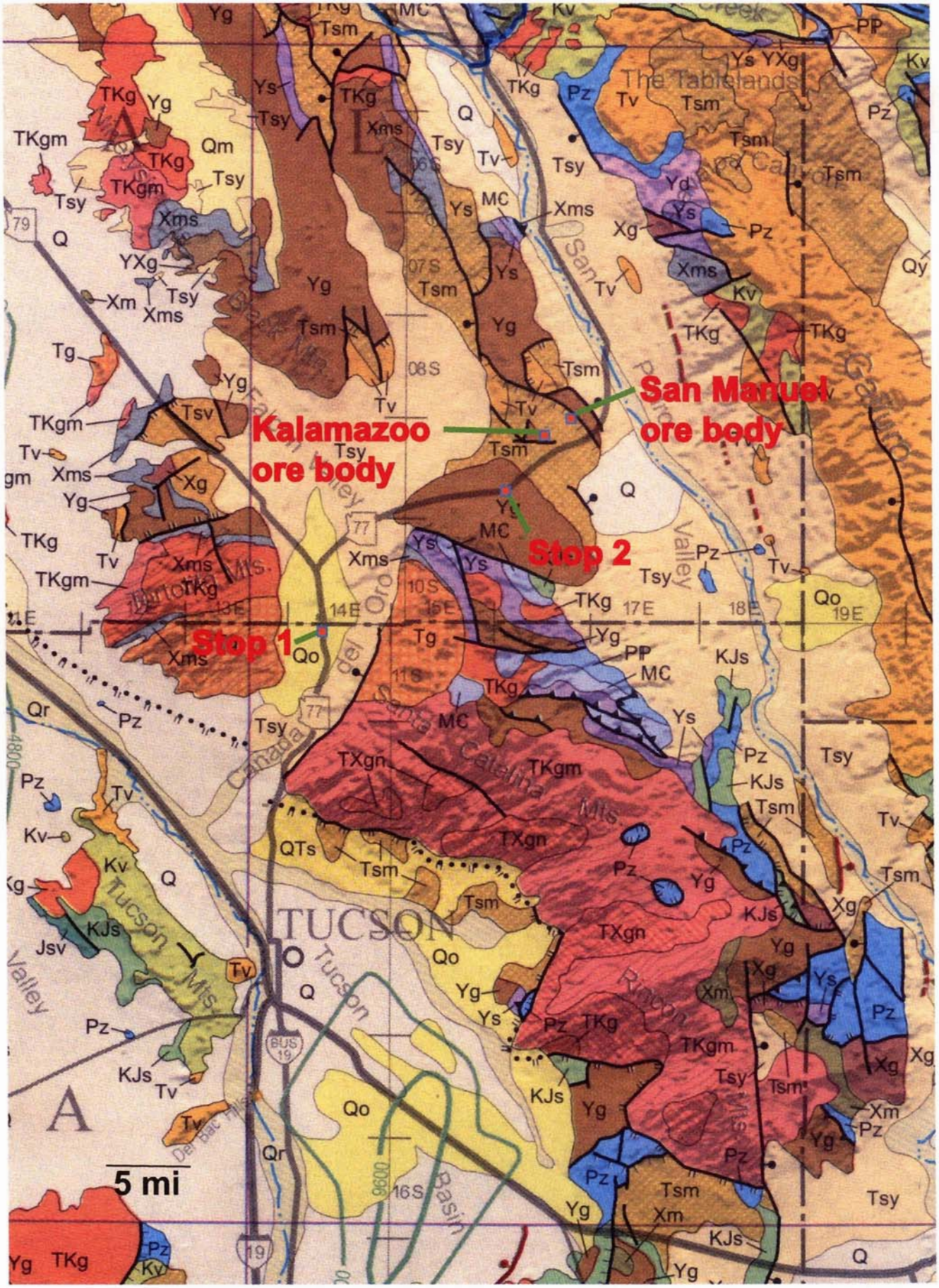
Cloudburst Formation
Consists of up to 5770 feet of interlayer conglomerate, sedimentary breccia, and volcanic rocks. The formation consists of two units: A lower volcanic unit consisting of andesitic lava flows and tuffs (3,900-4,900 ft thick) and an upper fanglomerate unit.

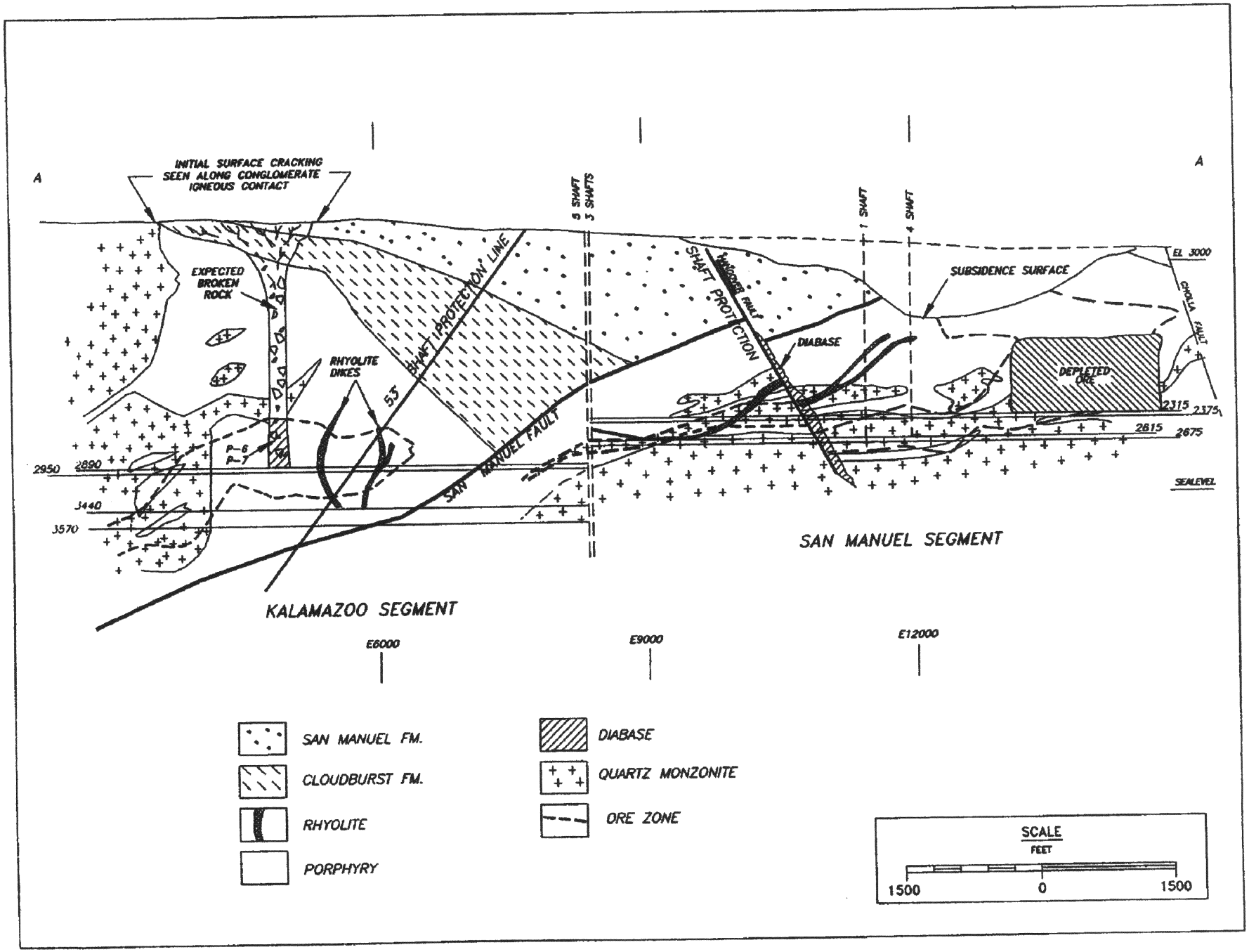
Rhyolite
The youngest rock to intrude the local ore bodies cuts all the older rocks types including the Cloudburst Formation. It is very fine grained and ranges from pink to greenish gray. In some case displays distinct flow banding.

San Manuel Formation

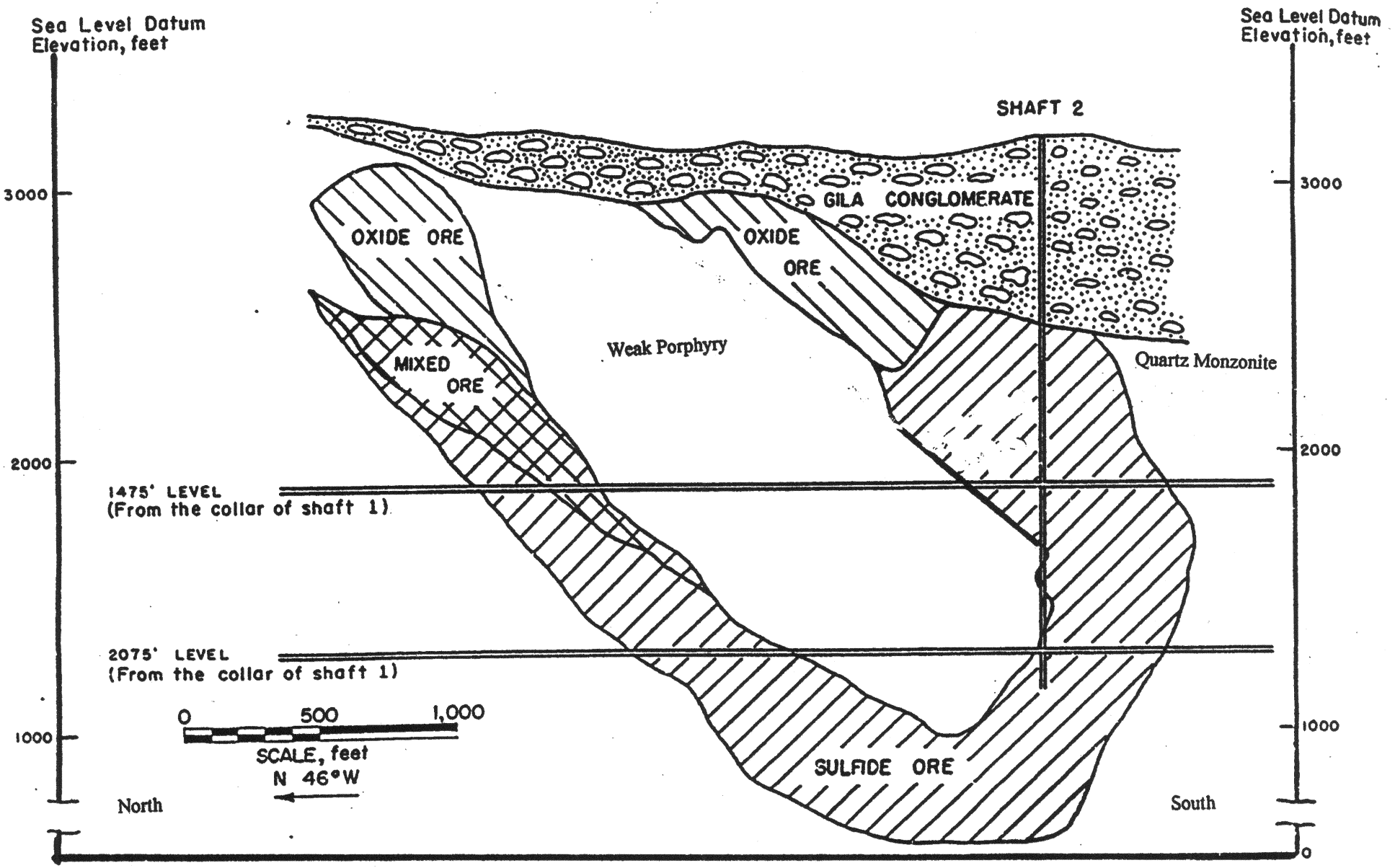
Weakly to moderately consolidated, reddish brown to light gray conglomerates with cobbles and boulders of light gray quartz monzonite, rhyolite, monzonite, diabase, and other basic rocks. This unit is nearly 4,000 feet thick in the Mammoth Area. The formation strikes N35°W to N50°W and dips approximately 30° to 40° NE.




San Manuel ore body
Kalamazoo ore body
Stop 1
Stop 2
TUCSON
5 mi



Generalized longitudinal section through the San Manuel-Kalamazoo Porphyry Copper Deposit.


Sea Level Datum
Elevation, feet
Sea Level Datum
Elevation, feet
SHAFT 2
3000
2000
1000
0
GILA CONGLOMERATE
OXIDE ORE
OXIDE
ORE
MIXED
ORE
Weak Porphyry
Quartz Monzonite
1475' LEVEL
(From the collar of shaft 1)
2075' LEVEL
(From the collar of shaft 1)
SULFIDE ORE
0
500
1,000
SCALE, feet
N 46°W
North
South